Hurricane and Severe Storm Sentinel (HS3) Mission

Purpose: Close to 100 million Americans live within 50 miles of a coastline, thus exposing them to the potential destruction caused by a land-falling hurricane. While hurricane track prediction has improved in recent decades, improvements of hurricane intensity prediction have lagged. This lag is primarily due to insufficient observations of the hurricane and its surrounding environment and a poor understanding of processes involved in storm intensity change.

For more than a decade, NASA has conducted field campaigns to research the genesis, intensity change, and structure of tropical cyclones. The scientific focus on intensity is particularly timely in light of the current heightened Atlantic storm activity and the continuing challenges of forecasting rapid tropical cyclone intensity change. With an aim to better understand how tropical storms form and develop into major hurricanes, NASA is conducting the Hurricane and Severe Storm Sentinel (HS3) Investigation, a five-year mission specifically targeted to enhance our understanding of the processes that underlie hurricane intensity change in the Atlantic Ocean basin. HS3 scientists hope to determine the extent to which the environment or processes internal to the storm are driving intensity change.

Scope:

Two NASA Global Hawk (GH) unmanned aircraft systems (UAS) will be used to fly in the region of developing Atlantic tropical storms or hurricanes. The GHs are ideal platforms for investigating hurricanes, because of their ability to carry heavy scientific payloads, to overfly deep thunderstorms, to use their long flight duration to reach storms over much of the Atlantic or to take measurements in nearby storms for long periods (2-3 times as long as conventional aircraft). Deployments from Goddard's Wallops Flight Facility (Wallops Island, VA) and 26-hour flight durations enable access to unrestricted air space, coverage of the entire Atlantic Ocean basin, and on-station times up to 20 hours. One of the GHs will be equipped with instruments geared toward measurement of the surrounding environment and the second with instruments suited to hurricane over storm inner-core structure and processes. The environmental payload includes the Scanning High-resolution Interferometer Sounder (S-HIS), the Advanced Vertical Atmospheric Profiling System (AVAPS, or dropsondes), the Cloud Physics Lidar (CPL) and the Tropospheric Wind Lidar Technology Experiment (TWiLiTE), while the over-storm payload includes the conically scanning High-Altitutde Imaging Wind and Rain Airborne Profiler (HIWRAP), the multi-frequency Hurricane Imaging Radiometer (HIRAD), and the High Altitude MMIC Sounding Radiometer (HAMSR). This is the first time NASA will fly the GHs from the U. S. East Coast, and the first time two GHs will fly sequentially to study the same phenomena over an extended time period. The effort will be coordinated with NOAA hurricane hunters, who will fly some of the same storms.

The HS3 science team's unrivaled experience offers a balance of theory, observations, modeling, and data assimilation. HS3's mix of partners from various NASA centers, NOAA, Department of Defense, and universities takes HS3 beyond a comprehensive hurricane data set into new paradigms and models that will enhance both our understanding of hurricane intensification and our modeling and prediction capabilities.

Sponsors:

HS3 is sponsored by the NASA Earth Science Division Earth Venture Program.

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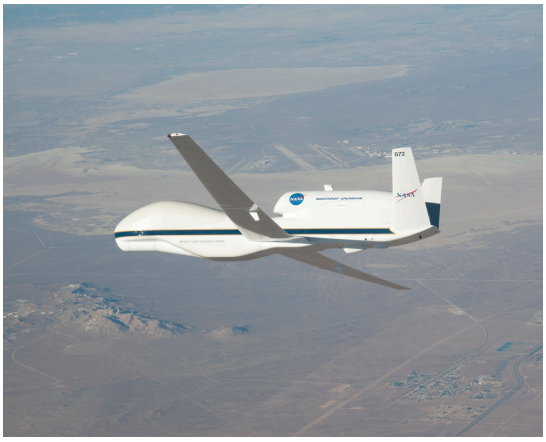
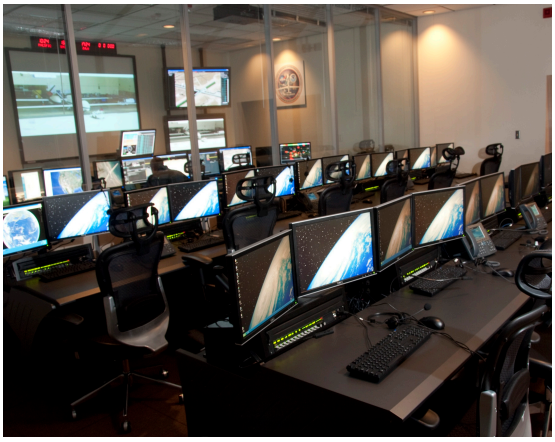
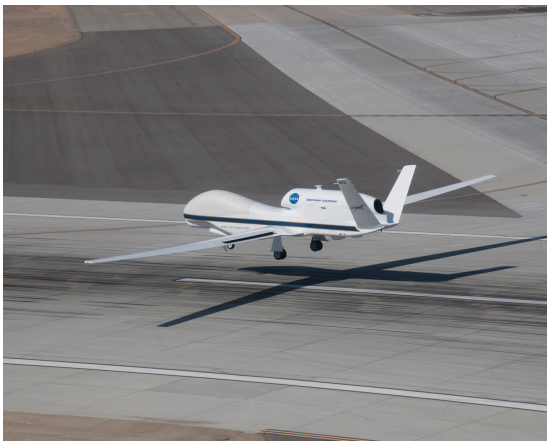


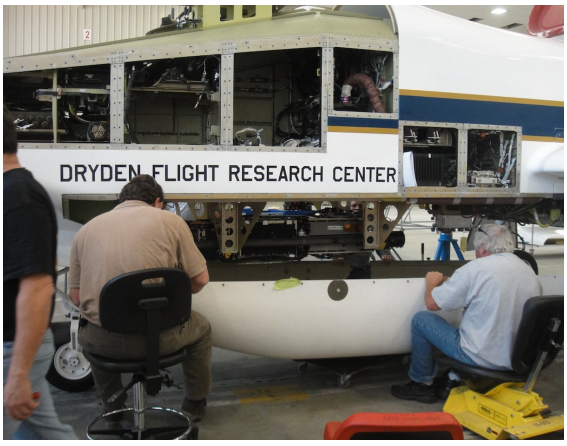
The NASA Global Hawk, manufactured by Northrup Grumman, flying over Edwards Air Force Base in California.



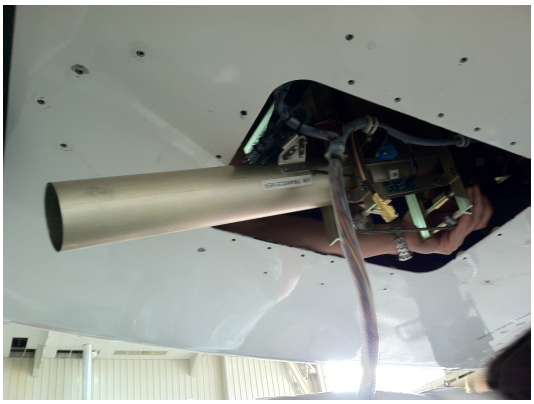
The GH Operations Center, where scientists, pilots and mission managers communicate with the aircraft and with instruments.



One of NASA's Global Hawks, landing at Dryden Flight Research Center at EAFB.



Installation of the Scanning High Resolution Interferometer Sounder onto the Global Hawk.



Advanced Vertical Atmospheric Profiling System – Dropsonde Launcher in the Global Hawk tail.

The Cloud Physics Lidar payload installation in the nose of the Global Hawk.

http://www.espo.nasa.gov/hs3/